CHAPTER 5 ALTERNATIVE AND PREFERRED ROUTE AND SUBSTATION SITES IDENTIFICATION

5.1 INTRODUCTION

This section describes the routing and substation alternatives and preliminary impacts.

5.2 GROUND RECONNAISSANCE RESULTS

Preliminary routes were identified using existing aerial photography after the sensitivity analysis was completed. These preliminary routes were ground checked and adjusted based on conditions identified in the field and not evident in the aerial photography so that realistic centerlines could be evaluated and compared.

5.3 ALTERNATIVE ROUTE IDENTIFICATION

A total of 8 alternative routes were identified during the alternative route identification phase of the project. These consist of 42 links refined within the identified corridors for the routing of the 230 kV, 345 kV and 500 kV (AC&DC) alternatives. Because the 345 kV and 500 kV AC (Townsend or Ringling Substations to existing Borah Substation) would have common origination and termination points, routing options for these voltages were consolidated. Alternative routes were analyzed for the 230 kV option (Mill Creek to Borah), and the 500 kV DC option (Townsend or Ringling Substation to Midpoint Substation. The first step in alternative route identification was to pick routes from potential subroutes where more than one link could be used between two points. From the links chosen in the subroutes, alternative routing options were identified. A total of 42 links were identified within the 26 corridors in Montana and Idaho.

5.3.1 Route Segments

From the 42 total links identified, 12 potential subroute alternatives (see Appendix A-1) within the corridors were identified, and are as summarized as follows:

Subroute 1 – Link 1 (47.4 miles) or Link 2 (39.4 miles)

Subroute 2 – Links 7 and 18 (43.4 miles) or Links 8, 9, 10 and 16 (52.2 miles)

Subroute 3 – Link 16 (95.7 miles) or Links 18, 24 and 28 (104.1 miles)

Subroute 4 – Link 37 or Links 38 and 39

Subroute 5 – Link 28 and 33 (45.5 miles) or Links 29 and 30 (58.6 miles)

Subroute 6 – Link 19 (25.6 miles) or Links 20 and 21 (31.1 miles)

Subroute 7 – Links 19 and 26 (30.4 miles) or Links 20, 22 and 23 (35.4 miles)

Subroute 8 – Links 3, 9 and 11 (50.3 miles) or Links 4 and 5 (39.9 miles)

Subroute 9 – Links 5 and 12 (44.4 miles) or Link 6 (43.9 miles)

Subroute 10 – Links 3, 9, 11 and 12 (57.5 miles), Links 4, 5 and 12 (52.1 miles), or Links 4 and 6 (51.6 miles)

Subroute 11 – Links 15 and 18 (12.5 miles), or Link 16 (9.6 miles)

Subroute 12 (500 kV DC) – Links 36 and 42 (123.5 miles), or Links 35, 39, 40, 41, and 42 (158.2 miles).

There were no subroutes identified for the 230 kV system option. The 230 kV electrical option consists of Links 14, 23, 27, 32, 35, 39 and 40, and length of 254.2 miles.

Superior routes were chosen from the subroute options and incorporated into the Project Alternatives. A summary of the subroutes and chosen links are shown in Appendix A-1.

5.3.2 Final Alternatives

A total of 10 alternatives were identified for identified for all 345 kV and 500 kV system options. These alternative are described below.

Townsend To Borah Alternatives

A total of four alternatives were identified for the Townsend to Borah electrical option (see Figure 5.3-1). These alternatives are summarized as follows:

Route A: North Boulder-West Jefferson Valley-Red Rock Alternative (Links 4, 6, 13, 19, 25, 30, 34, 38, 39, and 40)

This alternative route would originate at the (preferred) Townsend Substation (see Chapter 5.5.2), follow the existing Colstrip 500 kV transmission line on its south side, and diverge approximately 18 miles west of the Missouri River. This alternative would then continue westerly, crossing the Boulder River and S69 about 9-miles southeast of Boulder, and continues generally southerly on the east side of the Beaverhead-Deerlodge National Forest roughly paralleling Whitetail Road on its east side for about 7-miles.

It would then turn to the southwest, cross I-90 about 6-miles west of Whitehall, and continue south along the west side of the Jefferson River. The line would be located about 4-miles northwest of Twin Bridges, cross the Big Hole River about 9-miles east of Glen, and would continue generally southwest roughly paralleling the Beaverhead River approximately 5-6 miles from its west side until it turns due west about 5-miles east of the I-15 corridor, crossing the highway about 10 miles north of Dillon.

The line would then join the existing 161 kV transmission line approximately 8.5-miles south of Glen. This alternative would then follow the existing corridor east of Clark Canyon Reservoir and Red Rock paralleling I-15 on the west side and crossing to the east side of the highway south of Humphrey. The line would continue south along the corridor for about 47-miles south of Humphrey to a point about 1.5-miles north of the existing Jefferson Substation, where the line would turn westerly out of the corridor and then southwesterly crossing US-20 approximately 20-miles west of Twin Falls.

The line would continue generally south and west for about 36-miles and turn westerly approximately 8.5-miles east of the existing 230 kV transmission line located between Antelope Substation and Borah Substation. This alternative would then follow the existing 230 kV transmission line corridor for approximately 29-miles to the Borah Substation (see Figures 5.3-4, 5.3-5 & 5.3-6).

Route B: (Preferred Alternative) North Boulder Valley-West Jefferson Valley-INL Alternative (Links 4, 6, 13, 19, 26, 27, 32, 35, 39, and 40)

This alternative would originate at the (preferred) Townsend Substation, follow the existing Colstrip 500 kV transmission line on its south side, and diverge approximately 18 miles west of the Missouri River. This alternative would then continue westerly, crossing the Boulder River and S69 about 9-miles southeast of Boulder, and continue generally southerly on the east side of the Beaverhead-Deerlodge National Forest roughly paralleling Whitetail Road on its east side for about 7-miles.

It would then turn to the southwest, crosses I-90 about 6-miles west of Whitehall, and continue south along the west side of the Jefferson River. The line would be located about 4-miles northwest of Twin Bridges, cross the Big Hole River about 9-miles east of Glen, and would continue generally southwest roughly paralleling the Beaverhead River approximately 5-6 miles from its west side until it turns due west about 5-miles east of the I-15 corridor, crossing the highway about 10 miles north of Dillon.

This alternative would then cross the existing 161 kV transmission line located between Dillon Substation and Dell Substation in a southwesterly direction until it converges with the existing 230 kV transmission line located between Mill Creek Substation and Peterson Flats Substation, approximately 5.5-miles north of S278. The line then follows the existing corridor on its east side to Borah Substation approximately 193-miles to the south (see Figures 5.3-5, 5.3-6 & 5.3-7).

Route C: Three Rivers-Dillon-Black Tail Alternative (Links 3, 9, 10, 16, 24, 28, 33, 34, 38, 39, and 40)

This alternative route would originate at the (preferred) Townsend Substation and routed generally south paralleling S287 to the east and crossing the Missouri River about 2-miles southeast of Tosten. This alternative would parallel the river within approximately 3-miles on the west side to about 3-miles northwest of Three Forks, where it would turn generally southwest and converge with the existing 230 kV transmission line between Three Rivers Substation and Butte Substation paralleling it and I-90 for approximately 6-miles.

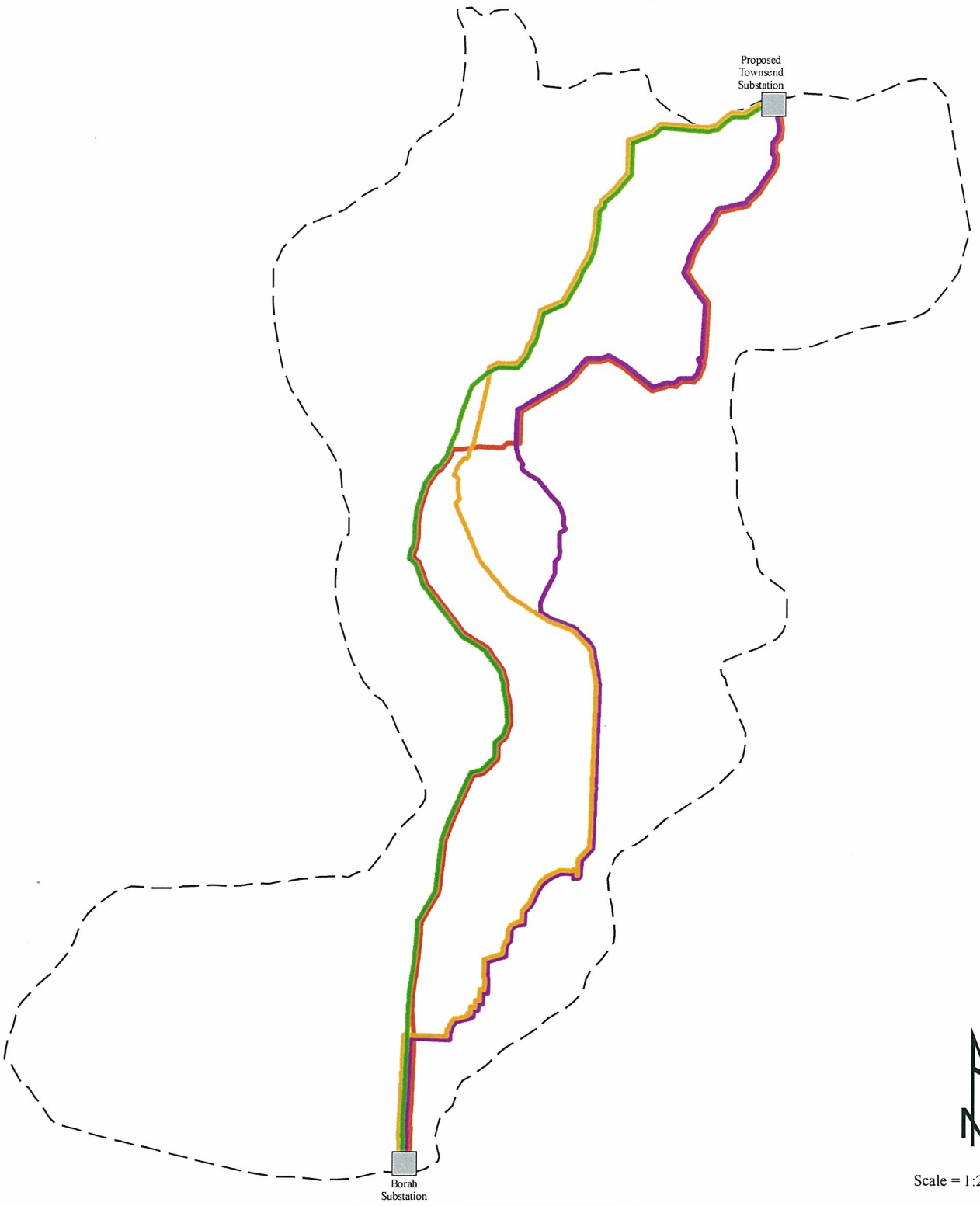
This alignment would turn southwest about 8-miles west of Three Rivers Substation, and pass Sappington about 1.5-miles to the east. This alternative would continue to the southwest until it would converge with the existing 115 kV transmission line corridor running between Butte Substation and Bradley Creek Substation, following it for approximately 9.5-miles where it would then turn south 6 miles northwest of Bradley Creek. The line would be oriented south for about 9 miles until it would intersect with the existing 161 kV transmission line corridor running between Ennis Substation and Bradley Creek Substation. From the Bradley Creek Substation, the route would continue to follow the 161 kV transmission line corridor for approximately 6-miles where it would diverge from the corridor slightly north of the Meadow Creek crossing.

The line would be roughly parallel to and about 0.5-mile west of S287. The route would then follow the 161 kV corridor for about 18-miles between McAllister and Virginia City. The line would continue to follow the corridor for another 12-miles to a point approximately 3-miles southeast of Sheridan. This alternative would then diverge from the existing corridor bearing west, and cross the Ruby River approximately 3-miles south of Sheridan.

The line would re-converg with the 161 kV transmission line running between Sheridan Substation and Dillon Substation about 4.5-miles to the southwest of Sheridan, and continue along the corridor to a point about 3-miles east of Dillon. The line would turn south, and cross Sweetwater Road about 2-miles west of Dillon. It would then continue south of Sweetwater Road for approximately 7-miles, where it would turn to the southeast and then generally parallel Blacktail Road for about 24-miles.

The route would diverge from Blacktail Road, and bear generally south towards the east end of Centennial Valley and Lima Reservoir. The route would cross the Red Rock River approximately 2-miles to the west of Lima Reservoir, and continue southwest crossing I-15 about 8-miles southeast of Lima and converge with the existing 161 kV transmission line running between Dell Substation and Big Grassy Substation.

The alignment would then follow the existing 161 kV transmission corridor about 65 miles to a point about 1.5-miles north of the existing Jefferson Substation, where the line would turn westerly out of the corridor and then southwesterly crossing US-20 approximately 20-miles west of Twin Falls. The line would continue generally south and west for about 36-miles and turn westerly approximately 8.5-miles east of the existing 230 kV transmission line located between Antelope Substation and Borah Substation (see Figures 5.3-8, 5.3-9, 5.3-10, 5.3-11 & 5.3-12).



Legend

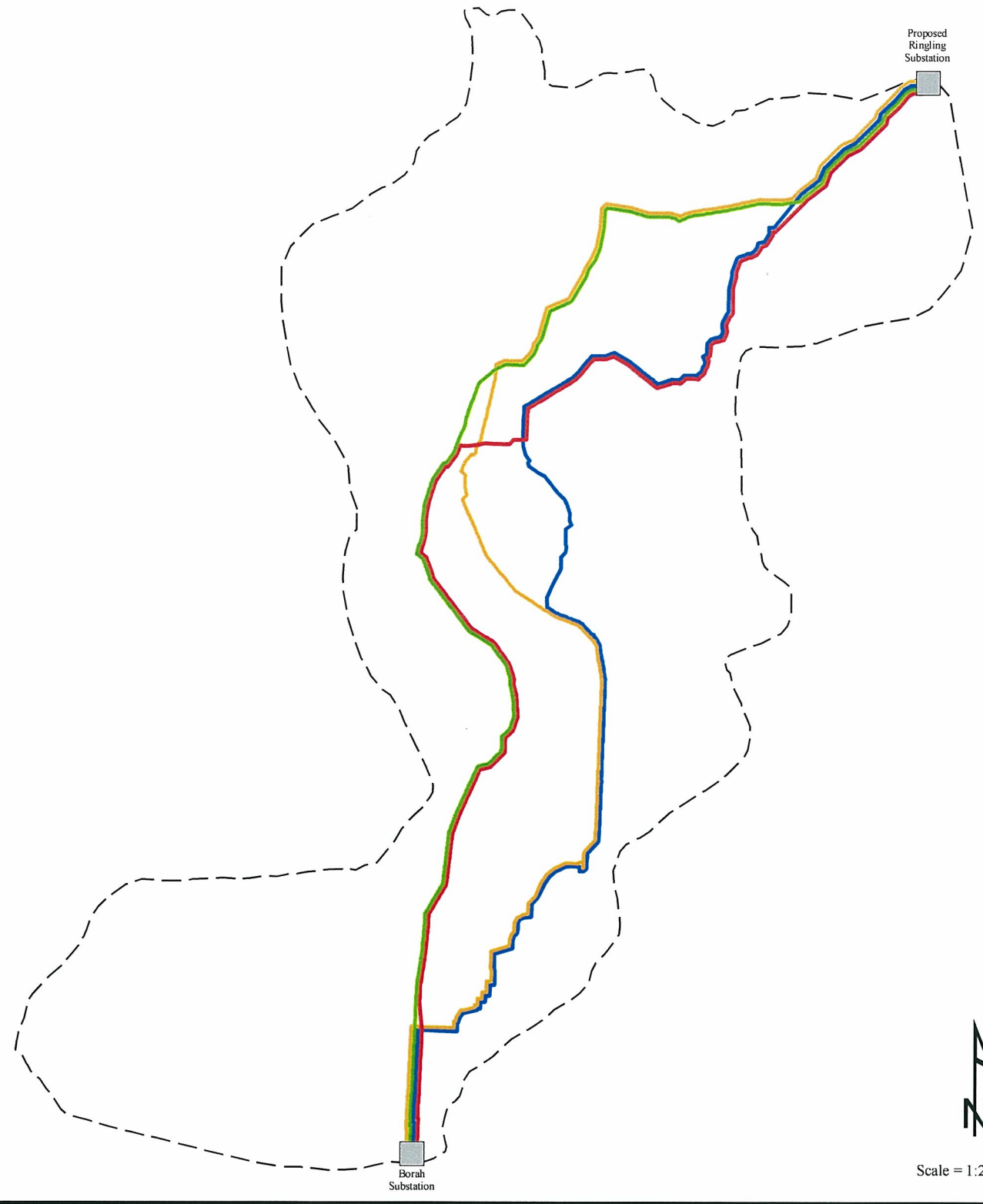
- Route A
- Route B (Preferred Route)
- Route C
- Route D
- Study Area Boundary

Figure 5.3-1

Townsend to Borah Alternative Routes

POWER ENGINEERS

NorthWestern Energy



Legend

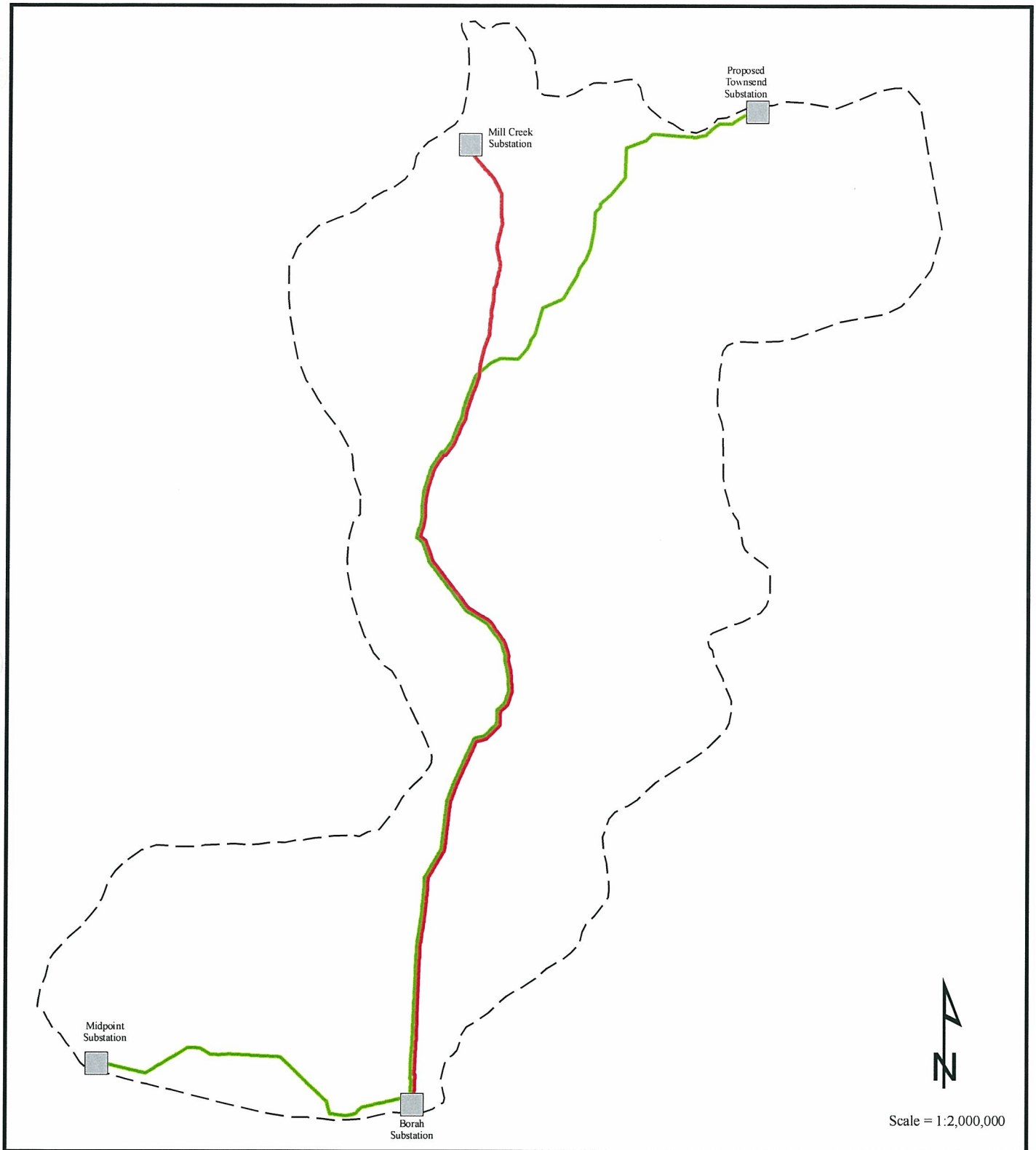
- Route E
- Route F
- Route G
- Route H
- Study Area Boundary

Figure 5.3-2

Ringling to Borah Alternative Routes

POWER ENGINEERS

NorthWestern Energy



Legend

- 500kV DC Route
- 230kV Route
- Study Area Boundary

Figure 5.3-3

230kV and 500kV DC Alternatives

POWER ENGINEERS

NorthWestern Energy

Route D: Three Rivers-Dillon-INL Alternative (Links 3, 9, 10, 16, 24, 29, 31, 32, 35, 39, and 40)

This alternative route would originate at the (preferred) Townsend Substation and routed generally south paralleling S287 to the east and crossing the Missouri River about 2-miles southeast of Tosten. This alternative would parallel the river within approximately 3-miles on the west side to about 3-miles northwest of Three Forks, where it would turn generally southwest and converging with the existing 230 kV transmission line between Three Rivers Substation and Butte Substation paralleling it and I-90 for approximately 6-miles.

This route would then turn southwest about 8-miles west of Three Rivers Substation, and pass Sappington about 1.5-miles to the east. It would then continue to the southwest until it would converge with the existing 115 kV transmission line corridor running between Butte Substation and Bradley Creek Substation, following it for approximately 9.5-miles where it would then turn south 6 miles northwest of Bradley Creek.

The line would be oriented south for about 9 miles until the intersection with the existing 161 kV transmission line corridor running between Ennis Substation and Bradley Creek Substation. From the Bradley Creek Substation, the route would follow the 161 kV transmission line corridor for approximately 6-miles where it would diverge from the corridor slightly north of the Meadow Creek crossing. The line would be roughly parallel to and about 0.5-mile west of S287.

The route would then follow the 161 kV corridor for about 18-miles between McAllister and Virginia City, then follow the corridor for another 12-miles to a point approximately 3-miles southeast of Sheridan. This alternative would then diverges from the existing corridor bearing west, and cross the Ruby River approximately 3-miles south of Sheridan. The line would re-converges with the 161 kV transmission line running between Sheridan Substation and Dillon Substation about 4.5-miles to the southwest of Sheridan, and continue along the corridor to a point about 3-miles east of Dillon.

The line would then turn south, and cross Sweetwater Road about 2-miles west of Dillon. Approximately 7-miles south of Sweetwater Road, the alignment would bear directly west for about 10.5-miles, and would then cross the I-15 corridor 10-miles southwest of Dillon, and then would cross the existing 161 kV transmission line corridor immediately to the west. The line would continue west until it would meet with the 230 kV transmission line corridor about 5-miles west of I-15 and east of Henneberry Ridge WSA. The line would then follow the existing 230 kV corridor to the Borah Substation approximately 172-miles to the south (see Figures 5.3-7, 5.3-8, 5.3-9, 5.3-10 & 5.3-12).

Ringling To Borah Alternatives

A total of four alternatives for the Ringling to Borah option were selected (see Figure 5.3-2). These alternatives are named as follows:

Route E: Madison-Dillon-Black Tail Alternative (Links 2, 7, 18, 24, 28, 33, 34, 38, 39, and 40)

This alternative route would begin at the West Ringling Substation Alternative and follow the existing Colstrip 500 kV transmission line corridor for approximately 5-miles. It would then diverge in a southwesterly direction for 34-miles towards Cutoff Road roughly paralleling Sixteen Mile Road for about three miles. The line would cross Sixteen Mile Creek between the Bridger Range and southeast of the Sixteenmile Creek Macrosite Nature Conservancy lands until it would cross the existing 230 kV transmission line corridor that crosses Flathead pass to the east.

After crossing the existing transmission line, this route would continue in a southwesterly direction towards Logan, crossing I-90 to the southeast. The line route would continue to the southwest towards Buffalo Jump Road crossing the Madison River approximately 10-miles north of S84. The line would continue generally south on the west side of the Madison River towards Norris, where it would converge with an existing 161 kV transmission corridor running between Jack Rabbit Substation and Bradley Creek Substation for a distance of about 3-miles to Bradley Creek. From the Bradley Creek Substation, the route would continue to follow the 161 kV transmission line corridor for approximately 6-miles where it would diverge from the corridor slightly north of the Meadow Creek crossing.

The line would be roughly parallel to and about 0.5-mile west of S287. This route would then follow the 161 kV corridor for about 18-miles between McAllister and Virginia City. It would continue to follow the corridor for another 12-miles to a point approximately 3-miles southeast of Sheridan. This alternative would then diverge from the existing corridor bearing west, and cross the Ruby River approximately 3-miles south of Sheridan.

The line would re-converge with the 161 kV transmission line running between Sheridan Substation and Dillon Substation about 4.5-miles to the southwest of Sheridan, and continue along the corridor to a point about 3-miles east of Dillon. The line route would then turn south, and cross Sweetwater Road about 2-miles west of Dillon, then continue south of Sweetwater Road for approximately 7-miles, where it would turn to the southeast to generally parallel Blacktail Road for about 24-miles.

The line route would diverge from Blacktail Road, and bear generally south towards the east end of Centennial Valley and Lima Reservoir. The alternative would then cross the Red Rock River approximately 2-miles to the west of Lima Reservoir, and continue southwest crossing I-15 about 8-miles southeast of Lima and converging with the existing 161 kV transmission line running between Dell Substation and Big Grassy Substation.

The alignment would then follow the existing 161 kV transmission corridor about 65 miles to a point about 1.5-miles north of the existing Jefferson Substation, where the line would turn westerly out of the corridor and then southwesterly crossing US-20 approximately 20-miles west of Twin Falls. The line would continue generally south and west for about 36-miles and turn westerly approximately 8.5-miles east of the existing 230 kV transmission line located between Antelope Substation and Borah Substation (see Figures 5.3-7, 5.3-8, 5.3-9, 5.3-10 & 5.3-11).

Route F: West Jefferson Valley-Red Rock Alternative (Links 2, 8, 9, 11, 12, 13, 19, 25, 30, 34, 38, 39, and 40)

This alternative route would begin at the West Ringling Substation Alternative and follow the existing Colstrip 500 kV transmission line corridor for approximately 5-miles. It would then diverge in a southwesterly direction for 34-miles towards Cutoff Road roughly parallel to Sixteen Mile Road for about three miles. The line would cross Sixteen Mile Creek between the Bridger Range and southeast of the Sixteenmile Creek Macrosite Nature Conservancy lands until converging with the existing 230 kV transmission line corridor that crosses Flathead pass to the east.

This route would parallel the existing 230 kV corridor for approximately 42-miles to a point about 6-miles northwest of Whitehall, where it would turn south along the west side of the Jefferson River. The line would be located about 4-miles northwest of Twin Bridges, cross the Big Hole River about 9-miles east of Glen, and would continue generally southwest roughly paralleling the Beaverhead River approximately 5-6 miles from its west side until it would turn west about 5-miles east of the I-15 corridor, would cross the highway about 10 miles north of Dillon.

The line would then join the existing 161 kV transmission line approximately 8.5-miles south of Glen, then follow the existing corridor east of Clark Canyon Reservoir and Red Rock parallel to I-15 on the west side and crossing to the east side of the highway south of Humphrey. The line would continue south along the corridor for about 47-miles south of Humphrey to a point about 1.5-miles north of the existing Jefferson Substation, where it would turn westerly out of the corridor and then southwesterly crossing US-20 approximately 20-miles west of Twin Falls.

The line would continue generally south and west for about 36-miles and turn westerly approximately 8.5-miles east of the existing 230 kV transmission line located between Antelope Substation and Borah Substation. This alternative would then follow the existing 230 kV transmission line corridor for approximately 29-miles to the Borah Substation (see Figures 5.3-4, 5.3-5 and 5.3-12).

Route G: West Jefferson Valley-INL Alternative (Links 2, 8, 9, 11, 12, 13, 19, 26, 27, 32, 35, 39, and 40)

This alternative route would begin at the West Ringling Substation Alternative and follow the existing Colstrip 500 kV transmission line corridor for approximately 5-miles. It would then diverge in a southwesterly direction for 34-miles towards Cutoff Road roughly parallel to Sixteen Mile Road for about three miles. The route would cross Sixteen Mile Creek between the Bridger Range and southeast of the Sixteenmile Creek Macrosite Nature Conservancy lands until it would converge with the existing 230 kV transmission line corridor crossing Flathead Pass to the east.

The line route would parallel the existing 230 kV corridor for approximately 42-miles to a point about 6-miles northwest of Whitehall, where it would turn south along the west side of the Jefferson River. The line would be located about 4-miles northwest of Twin Bridges, cross the Big Hole River about 9-miles east of Glen, and would continue generally southwest roughly paralleling the Beaverhead River approximately 5-6 miles from its west side until it would turn due west about 5-miles east of the I-15 corridor, crossing the highway about 10 miles north of Dillon.

This route alternative would then cross the existing 161 kV transmission line located between Dillon Substation and Dell Substation in a southwesterly direction until it would converge with the existing 230 kV transmission line located between Mill Creek Substation and Peterson Flats Substation, approximately 5.5-miles north of S278. The line then follows the existing corridor on its east side to Borah Substation approximately 193-miles to the south (see Figures 5.3-5, 5.3-7 & 5.3-12).

Route H: Madison-INL Alternative (Links 2, 7, 18, 24, 29, 31, 32, 35, 39, and 40)

This route alternative would begin at the West Ringling Substation Alternative and follow the existing Colstrip 500 kV transmission line corridor for approximately 5-miles. It would diverge to the southwest for 34-miles towards Cutoff Road and roughly parallel to Sixteen Mile Road for about three miles. The line would cross Sixteen Mile Creek between the Bridger Range and southeast of the Sixteenmile Creek Macrosite Nature Conservancy lands until it would converge with the existing 230 kV transmission line corridor that crosses Flathead Pass to the east.

This route would continues in a southwesterly direction towards Logan, crossing I-90 to the southeast, then continuing to the southwest towards Buffalo Jump Road crossing the Madison River approximately 10-miles north of S84. The line would continues generally south on the west side of the Madison River towards Norris, where it would converge with an existing 161 kV transmission line corridor running between Jack Rabbit Substation and Bradley Creek Substation for a distance of about 3-miles to Bradley Creek.

From the Bradley Creek Substation, the route would continue to follow the 161 kV transmission line corridor for approximately 6-miles, then diverge from the corridor slightly north of the Meadow Creek crossing. The line would be roughly parallel to and about 0.5-mile west of S287.

The line route would then follow the 161 kV corridor for about 18-miles between McAllister and Virginia City, then follow the corridor for another 12-miles to a point approximately 3-miles southeast of Sheridan. It would then diverge from the existing corridor bearing west, and cross the Ruby River approximately 3-miles south of Sheridan. The line would re-converge with the 161 kV transmission line running between Sheridan Substation and Dillon Substation about 4.5-miles to the southwest of Sheridan, and then continue along the corridor to a point about 3-miles east of Dillon.

Here the line route would turn south and cross Sweetwater Road about 2-miles west of Dillon. Approximately 7-miles south of Sweetwater Road, the alignment would bear due west about 10.5-miles, where it would cross the I-15 corridor 10-miles southwest of Dillon, then cross the existing 161 kV transmission line corridor immediately to the west. The line would continue west until its junction with the 230 kV transmission line corridor about 5-miles west of I-15 and east of Henneberry Ridge WSA. The line would then follow the existing 230 kV corridor to the Borah Substation approximately 172-miles to the south (see Figures 5.3-8, 5.3-9, 5.3-10 & 5.3-11).

Figure 5.3-4: View North at Pipe Organ Rock Physical Constraint (Alternatives A, F & J)

Figure 5.3-5: View Southwest from the I-90 Crossing Near Pipestone (West of Whitehall) Alternatives A, B, F, G and J)

Figure 5.3-6: View South from Crossing of Old Highway Between Whitehall and Butte (Alternatives A, B & J)

Figure 5.3-7: View North on the Idaho National Laboratory from Highway 20/26 (Alternatives B, D, E, G, I and J)

Figure 5.3-8: View South from South of Dillon Towards Scattered Residences and Rural Developments (Alternatives C, D, E & H)

Figure 5.3-9: View of Hills North of Virginia City from Highway 287 (Alternatives C, D, E & H)

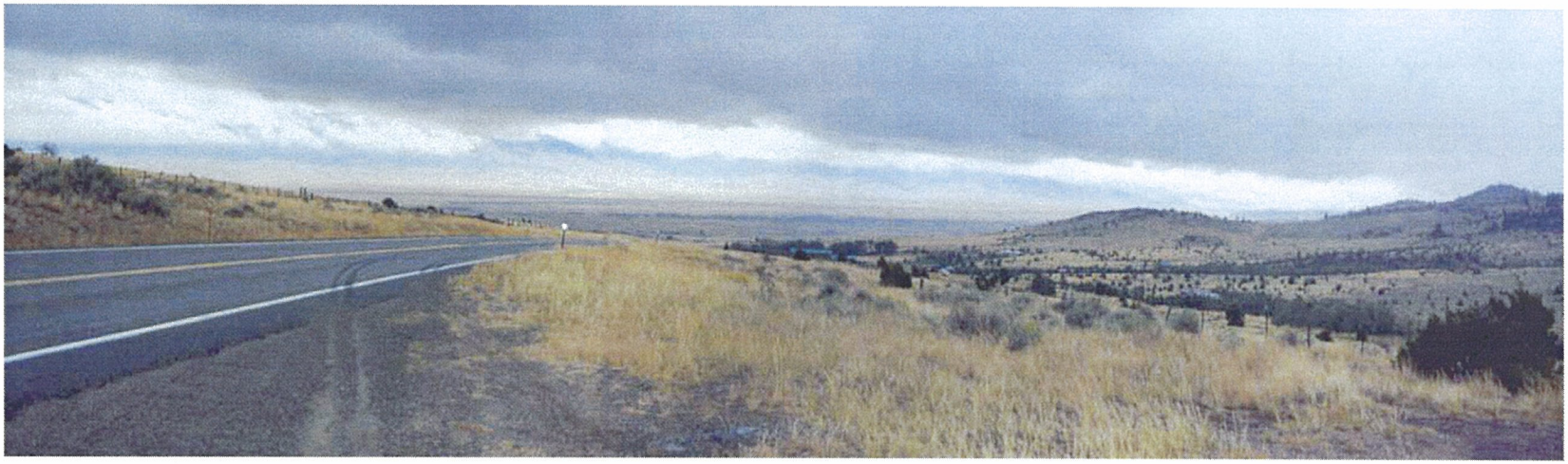


Figure 5.3-10: View East on Highway 287Over the Madison Valley from Scenic Overlook West of Ennis (Alternatives C, D, E & H Behind)

Figure 5.3-11: View to the Northwest from Ennis (Alternatives C, D, E & H)

Figure 5.3-12: View from Highway 287 of Development Occurring North of the Wheat Montana Area (Alternatives C, D, F, & G)

Figure 5.3-13: View Southwest from I-90 at Scattered Housing West of Butte (Alternative I)

Figure 5.3-14: View of Midpoint Substation (Alternative J)

Other Alternatives

Route I: 230 kV Alternative (Links 14, 23, 27, 32, 35, 39 and 40)

This alternative route would originate at the Anaconda (Mill Creek) Substation located approximately 3-miles southeast of Anaconda, then parallel the existing 230 kV transmission line running to the Borah Substation in Idaho 254-miles to the south (see Figures 5.3-3 and 5.3-13).

Route J: 500 kV DC Alternative (Links 4, 6, 13, 19, 26, 27, 32, 35, 39, 40, 41 and 42)

This route would follow the same route as the 500 kV Preferred Alternative from the Townsend Substation in Montana to a point approximately 2.5-miles north of the Borah Substation. From here it would bear west following the 230 kv/345 kV corridor between Borah Substation and Midpoint Substation on its north side to the Midpoint Substation (see Figures 5.3-3 and 5.3-14).

5.4 PRELIMINARY IMPACT ASSESSMENT

Using the methodology detailed in Chapter 2.11, expected residual impacts for each resource were determined for each alternative, and summarized in Appendix A-2.

5.5 ALTERNATIVE ROUTE AND SUBSTATION COMPARASION

5.5.1 Alternative Routes

Expected alternative route impacts for the Townsend to Borah option and the Ringling to Borah options as described below. A summary comparison of the alternative routes is shown on Table 5.5-1.

Townsend To Borah Alternatives

A total of four alternatives were identified for the Townsend to Borah electrical option. These alternatives are summarized as follows:

Route A: North Boulder-West Jefferson Valley-Red Rock Alternative

This 330 mile route alternative has the lowest mileage of high residual impacts and miles of steep slope (>20%) crossed, but ranks relatively low compared to the other alternatives because of the high number of stream crossings and agricultural lands crossed. This alternative also ranks relatively low compared to other alternatives in the amount it would parallel existing transmission line corridors, and also is expected to have one of the highest visual impacts. This alternative ranks highest for water and wetland resource impacts.

Route B Preferred Alternative: North Boulder Valley-West Jefferson Valley-INL Alternative

This 301.3 mile route alternative is the preferred routing option. It ranks second in expected high residual impacts, and crosses the fewest number of streams and agricultural lands. This routing option also is the second lowest in the amount of steep slopes crossed, and follows a relatively high proportion of its length along existing transmission line corridor (71.6%). The 3.0 miles of Exclusion area crossed by this alternative are the result of traversing a small portion of the Limestone Hills Training Area (on the extreme south side and parallel with the existing Colstrip line, and within the proposed West-Wide Energy Corridor), some high density subdivision PLSS sections requiring more detailed analysis, and VRM Class I BLM lands located outside of SMA's or other protected lands and also following an existing 230 kV transmission line corridor. This alternative is also tied for lowest expected high residual visual impacts.

Route C: Three Rivers-Dillon-Black Tail Alternative

This 336.8 mile alternative route ranks relatively low compared to other corridors except in the number of existing line crossings and miles of steep slope traversed. It is the least desirable in terms of amount of agricultural lands crossed and proximity to existing roads. This alternative is expected to have the greatest amount of high residual impacts. It ranks in the middle for total mileage and percentage of the total line for expected high residual impacts.

Route D: Three Rivers-Dillon-INL Alternative

Townsend to Borah Route Alternative D is 323.8 miles long, and would parallel the existing transmission line ROW corridor of the alternatives, in both total length and percentage of the total alternative length. However, it is the lowest ranking alternative for potential high residual impact levels and conversely of expected low residual impacts. This alternative is also expected to have the greatest mileage of high residual cultural resource impact levels, and is also ranked second lowest for the number of streams crossed along the centerline, and is relatively low in terms of proximity to existing access road proximity and amount of steeply sloping lands crossed.

Ringling To Borah Alternatives

A total of four alternatives for the Ringling to Borah option were selected. These alternatives are named as follows:

Route E: Madison-Dillon-Black Tail Alternative

Route E is a 353.5 mile alternative is tied with the Preferred Alternative (Route B) in the lowest amount of stream crossing along the centerline. This alternative otherwise ranks fairly low in the relative amount of agricultural lands and steep slopes crossed, proximity to existing access roads, and is lowest in terms of amount paralleling existing transmission lines, both as a percentage of the total length and linear miles. It is tied for the highest mileage of expected residual biological resource impacts.

Route F: West Jefferson Valley-Red Rock Alternative

This 361.6 mile alternative is the longest of the (345 kV or 500 kV) routes. As would be expected, this alignment crosses the most streams, but also ranks fairly low in terms of amount of agricultural lands crossed and expected residual biological resource impacts.

Route G: West Jefferson Valley-INL Alternative

Route Alternative G is 332.7 miles in length, and has the most existing transmission line crossing of the alternatives. It also ranks fairly low in the amount of steep slopes crossed and total amount (percentage and mileage) of expected high residual impacts. This alternative ranks second highest in the amount of agricultural lands crossed and mileage paralleling existing transmission line corridors and roads. Initial and residual high cultural resource impacts are expected to be low.

Route H: Madison-INL Alternative

This 340.5 mile alternative crosses the most amount of steeply sloping lands and have the second highest expected amount of composite residual high impacts. Residual high cultural resource impacts are expected to be high.

Table 5.5-1. Transmission Line Alternative Comparison

	Route ID	Links	Route Length (miles)	Biological High and Moderate Sensitivity (miles)	Stream Crossings	Agricultural Lands Crossed (miles)	Steep Slopes over 20% (miles)	Parallel Existing Roads (miles)	Parallel Existing Transmission Lines (miles)	Parallel to Existing 230kV Line (miles)	Crossings of Existing Lines	Comments		Composite Impact Modified			
														Exclusion	High	Moderate	Low
Townsend Option 345kV and 500kV	A	4, 6, 13, 19, 25, 30, 34, 38, 39, 40	330.3	22.1	24	45.9	45.4	63.6	178.9	50.5	14 crossings (345kV - 1; 230kV - 3; 161kV - 3; 138kV - 2; 100kV - 2; 69kV - 2; Unk-1)	Highest Visual Impacts. High water and wetland impacts.		2.5	113.8	77.1	137.5
	Preferred Route																
	B	4, 6, 13, 19, 26, 27, 32, 35, 39, 40	301.3	16.2	21	23.7	52.9	69.5	215.8	215.8	17 crossings (345kV - 1; 230kV - 5; 161kV - 3; 138kV - 2; 100kV - 2; 69kV - 1; Unk - 3)	Shortest Route. Most miles parallel to the existing Mill Creek to Borah 230kV transmission line. Fewest stream crossings. Least new roads needed for construction.		2.3	117.2	94.5	88.0
	C	3, 9, 10, 16, 24, 28, 33, 34, 38, 39, 40	336.8	56.2	24	50.6	56.8	53.7	161.1	36.1	14 crossings (345kV - 1; 230kV - 3; 161kV - 3; 138kV - 2; 100kV - 2;69kV - 2; Unk-1)	Most agricultural lands crossed. Highest composit residual impacts.		1.1	126.2	92.4	117.7
	D	3, 9, 10, 16, 24, 29, 31, 32, 35, 39, 40	323.8	28.1	25	38.3	65.8	59.0	244.2	186.3	17 crossings (345kV - 1; 230kV - 5; 161kV - 4; 138kV - 2; 100kV - 2; Unk-3)	Most rugged terrain. Highest expected cultural resource impacts.		2.9	147.4	97.7	76.5
Ringling Options 345kV and 500kV	E	2, 7, 18, 24, 28, 33, 34, 38, 39, 40	353.5	73.8	21	46.1	58.6	55.8	153.0	34.1	16 crossings (345kV - 1; 230kV - 3; 161kV - 5; 138kV - 2; 100kV - 2; 69kV - 2, Unk-1)	All Ringling options are longer than the Townsend options, and more potential impacts would occur as a result. High expected residual biological impacts.		1.8	124.8	109.2	118.1
	F	2, 8, 9, 11, 12, 13, 19, 25, 30, 34, 38, 39, 40	361.6	23.2	26	49.4	59.4	62.7	206.3	77.9	18 crossings (345kV - 1; 230kV - 3; 161kV - 5; 138kV - 2; 100kV - 3; 69kV - 2; Unk-2)	All Ringling options are longer than the Townsend options, and more potential impacts would occur as a result. Longest route. Crosses the most streams.		4.0	137.6	86.3	134.5
	G	2, 8, 9, 11, 12, 13, 19, 26, 27, 32, 35, 39, 40	332.7	17.3	23	27.2	66.9	68.6	243.2	243.2	20 crossings (345kV - 1; 230kV - 5; 161kV - 5; 138kV - 2; 100kV - 3; 69kV - 1; Unk-3)	All Ringling options are longer than the Townsend options, and more potential impacts would occur as a result. Crosses most exsitng transmission lines.		3.8	141.0	103.7	85.0
	H	2, 7, 18, 24, 29, 31, 32, 35, 39, 40	340.5	45.7	23	33.8	67.6	61.1	236.1	184.3	19 crossings (345kV - 1; 230kV - 5; 161kV - 5; 138kV - 2; 100kV - 2; 69kV - 1; Unk-3)	All Ringling options are longer than the Townsend options, and more potential impacts would occur as a result. Crosses the most steeply sloping land.		3.6	146.0	114.5	76.9
500kV	I	4,6,13,19,26,27,32,35, 39,40,41,42	385.1		21	26.6	53.1	79.1	297.5	297.4	19 crossings (230kV - 9; 161kV - 3; 100kV - 2; 69kV - 1; Unk-4)			2.3	126.3	97.0	160.0
230 kV	J	14, 23, 27, 32, 35, 39, 40	254.2		18	19.5	43.6	72.4	254.5	254.5	16 crossings (345kV - 1; 230kV - 5; 161kV - 4; 138kV - 2; 69kV - 1; Unk-3)			3.3	104.7	76.5	70.1

Other Alternatives

Route I: 230 kV Alternative

The 230 kV Alternative is expected to have 104.7 miles of high residual impacts.

Route J: 500 kV DC Alternative

The Preferred Alternative for the 500 kV (AC) Alternative was chosen for analysis, and the better DC subroute option chosen as the Preferred Alignment for this electrical system configuration was added.

This alternative routing option was identified based on the Route B and better DC subroute option (Links 14, 23, 27, 32, 35, 39 and 40). A summary of expected residual impacts and environmental data are shown in Appendix A-1.

5.5.2 Substations

All potential substation locations are bisected by or adjacent to the Colstrip 500 kV transmission line.

A total of five potential sites for substation locations were identified using criteria detailed in Chapter 2.7 for the Townsend and Ringling areas (see Table 5.5-2 Alternative Substation Site Comparison). Two locations were chosen for Townsend and three for Ringling (See Exhibit 14). All potential substation sites are located on private lands, and would have similar permitting, zoning, planning and permitting requirements. The counties of Broadwater and Meagher do not have zoning regulations, and substation construction would require coordination and consultation with the Montana State Department of Labor and Industry regarding building permits. Subdivision of parcels would require conformance with county subdivision regulations.

The two potential locations for the Townsend area substation are located east of the ownership change along the Colstrip line. The West Substation Alternative (T1) is located on a parcel directly north of where the existing line northeast of the single-pole, double circuit to two single-circuit pole transition occurs. This parcel is vacant, but currently is under mechanically irrigated cultivation. The parcel would not need to be subdivided, and is approximately 99 acres in size (about 3500-feet by 1200-feet). Access to the site would require approximately 1,115-feet of new access road construction, and is about 2,100-feet from US 287, and about 2,800-feet north of Dry Creek Road. The existing Colstrip R-O-W access could be used as a route to the site. Adjacent land use is primarily irrigated agriculture. The closest residence is approximately 1,175-feet to the southwest (see Figure 5.5-1).

The East Townsend Substation Alternative (T2) occupies two parcels, and is the Preferred Alternative Substation site. They are approximately 4,000-feet east of Flynn Lane northeast of its intersection with Dry Creek Road. The western parcel is approximately 144 acres in size, and the eastern parcel is approximately 636 acres in size. They both would likely need to be subdivided or split. These parcels are vacant and currently serve as pasture. The eastern parcel contains agricultural outbuildings and a residence, located about 1,030-feet the southwest. Access to the site would be from Dry Creek Road, and the substation would not require additional access road construction. Adjacent land use is a mixture of center-pivot irrigation and pasture (see Figure 5.5-2).

Three parcels were identified for Ringling area substation. The West Substation Alternative (R1) is bisected by the Colstrip line, and is approximately 611 acres in size. This parcel is also vacant and serves as dry grazing land. Access to the site would be from S294 to the north. Approximately 1,060-feet of new access road would be required. Adjacent land use is a mostly for dryland grazing. The closest residence is approximately 6,800-feet to the northeast.

The Middle Substation Alternative (R2) is also located south of S294, has existing access, and would require no new access road construction. This parcel is also vacant with some dryland cultivation currently taking place, and is approximately 458 acres in size. Adjacent land use is a mostly for dryland grazing. The closest residence is approximately 1,500-feet to the northeast (see Figure 5.5-3).

The East Substation Alternative for the Ringling site is the most difficult to access, and would require about 1,430-feet of new access road construction from S294 crossing some terrain sloping over 8%. This parcel is also vacant with some dryland cultivation currently taking place, and is approximately 621 acres in size. Adjacent land use is a mostly for dryland grazing. The closest residence is approximately 1,660-feet to the northwest.

Table 5.5-2 Alternative Substation Site Comparison

Substation Site Name	Siting Factors and Issues							
	Parcel Size (acres)	Existing Land Use	Land Cost[A]	Subdivision/Split Necessary (Yes/No)	Distance to Nearest Residence (feet)	Composite Sensitivity	Approximate Length of Required New Access Road (feet)	Notes
Townsend								
West (T1)	99	A	$297,000	N	1,175	H	1,115	
East (Preferred Substation Site, T2)	144 & 636 (2 Parcels	G	$125,000[B]	Y	1,030	L	0	
Ringling								
West (R1)	611	S	$125,000[B]	Y	6,762	H	1,060	1
Middle (R2)	458	S	$125,000[B]	Y	1,490	H	0	2
East (R3)	621	S	$125,000[B]	Y	1,660	M	1,430	3

Key: S=Shubland/dry grazing
G=Grassland/herbaceous upland
A=Agriculture
H=High Sensitivity
M= Moderate Sensitivity
L= Low Sensitivity/Opportunity
T= Substation may be placed directly under the Colstrip 500 kV Transmission Line

1) On/adjacent to abandoned railroad ROW
2) Requires drainage/riparian crossing for road construction
3) On a local high point

[A] Based on $3,000/acre value for agricultural lands and $2,500/acre for all other lands.
[B] Not including subdivision/split costs

Figure 5.5-1: View of Townsend "East" Alternative Substation Site

Figure 5.5-2: View to North of Colstrip 500 kV Lines and Townsend "West" Alternative Substation Site

Figure 5.5-3: View East Towards Colstrip 500 kV Lines and Ringling Middle Alternative Substation Site

5.6 PREFERRED ROUTE AND SUBSTATION SELECTION

The Preferred Route and Substation was chosen based on several factors, including potential environmental impact, engineering constraints, overall costs, and proximity to existing facilities.

Transmission line routing Alternative B was chosen due to its relatively low environmental impacts, relatively low costs, proximity to existing access roads and relatively low amount of new access road construction necessary, low number of stream crossings, and the relatively low amount of steeply sloping terrain along the centerline.

The east Townsend Substation site (Preferred Substation) is located in a low composite sensitivity area and would require no new access road construction. Expected land use impacts would also be low because the existing use is not agricultural or grazing.